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Published in:
Leiden Working Papers in Linguistics

Publication date:
2008

Document Version
Publisher's PDF, also known as Version of record

[Link to publication in Tilburg University Research Portal](#)

Citation for published version (APA):
Hoetjes, M. W. (2008). The use of gestures in placement events. *Leiden Working Papers in Linguistics*, 5(1), 24-35.

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The use of gestures in placement events^{*}

Marieke Hoetjes

Slobin's 'thinking for speaking' hypothesis states that our language influences thought as we prepare to speak (Slobin 1991). Differences between languages can thus be hypothesised to cause differences in thought. The domain of placement events is an example where different languages use verbs with different semantic characteristics to describe the same event. Speakers of English for example, can use the verb *put* to describe all types of placement events, whereas speakers of Dutch need to choose between the more fine-grained placement verbs *zetten* 'set' and *leggen* 'lay'. In order to find out whether these linguistic differences reflect deeper representational differences, and to find out what happens to 'thinking for speaking' in an L2, gesture use during speech has been studied (Gullberg to appear, Gullberg submitted). This study uses English as a new language in which to examine these questions.

1. Introduction

Everyday life consists of an enormous amount of input. People mentally categorise this input into groups of objects and events. These categories can be coarse-grained or fine-grained, depending on the situation. A seagull can be grouped with all other birds, birds can be grouped with other animals and so on. Research has shown that languages differ in the way in which this mental categorisation and representation takes place. Speakers of different languages differ in their categorisation of, for example, body parts (Enfield, Majid & van Staden 2006), different types of cutting and breaking events (Majid, van Staden, Boster & Bowerman 2004), or 'putting' and 'taking' events (Kopecka & Narasimhan to appear). This is due to cross-linguistic differences in semantic typology, that is, the way in which certain linguistic domains are encoded cross-linguistically.

Does the fact that speakers of different languages categorise events in different ways also mean that they experience these events in different ways? One view is that basic human experience is the same, no matter what language people speak. This would mean that even though people might describe things in a different way, they underlyingly have the same mental representation. A different view holds that the mental representation or conceptualisation of an object or event is influenced by the language we speak. People describe things in a certain way because the language they speak forces them to do so (Slobin 1991; Von Stutterheim & Nüse 2003). People can only use the linguistic categories that their language provides them with. These linguistic categories and the semantic characteristics encoded in labels matching these categories may cause people to be attentive to certain

^{*} In Elizabeth Koier, Olivia Loonen & Marieke Meelen (eds.), *Leiden Working Papers in Linguistics* 5.1 (2008), (24-35).

aspects of speech. In spatial language, for example, Choi & Bowerman (1991) show that children acquiring English focus more on the path of a motion event than Korean children, due to the fact that path is a separate component in English, expressed in prepositions and particles. As they state: 'This means that language learners do not map spatial words directly onto nonlinguistic spatial concepts, as has often been proposed, but instead are sensitive to the semantic structure of the input language virtually from the beginning' (Choi & Bowerman 1991:117-118).

The view that the mental representation of an event is influenced by the language we speak, or in other words, the idea that language influences thought, is known as the principle of linguistic relativity (for an historical background, see Gumperz & Levinson 1996). Slobin's version of the principle of linguistic relativity, the 'thinking for speaking' hypothesis, states that the *habitual* way in which a language encodes an event influences the way in which a speaker conceptualises this event as he prepares to speak (Slobin 1991). Therefore the default way in which an event is described causes the speaker to have a certain language-specific mental representation of this event. This can be due to, for example, language-specific word order or language-specific semantics of certain words. In the case of motion events in English, described by Choi & Bowerman (1991), emphasis in the mental representation of a motion event is on the path of the event. This is caused by the fact that path is a separate component in speech when describing a motion event. The language that is used guides the speaker to be attentive to certain parts or types of information. This, however, does not mean that we know to what extent event representation is language-specific. As Gullberg states, '[t]he question remains to what extent differences in linguistic categories result in mere surface differences in speech, and to what extent, if any, such differences reflect a deeper difference in speakers' attention to different sorts of information and in their construals of events as they prepare to talk about them' (Gullberg to appear: 4).

This paper will report on an extension of an ongoing research project which examines this question (Bowerman, Gullberg, Majid, & Narasimhan 2004; Kopecka & Narasimhan to appear; Gullberg to appear, Gullberg submitted). This study examines English data in the domain of placement events, as this language so far remains uninvestigated in this respect. This study will take gesture use into account.

2. Placement events

One of the domains in which there are cross-linguistic differences in the way in which events are categorised is the domain of placement events. Placement events are everyday events in which something is moved somewhere, for example when a cup is put on a table (Bowerman, Brown, Eisenbeiss, Narasimhan, & Slobin 2002; Kopecka & Narasimhan to appear; Gullberg to appear). The event typically involves an agent, an object and an end location (also known as ground).

It can be argued that mental representation of placement events is the same across languages because placement events are such basic human experiences (cf. Pinker 1989). It has been shown, however, that different languages differ in how they encode these events (Kopecka & Narasimhan to appear; Gullberg to appear, Gullberg submitted). Some languages may encode the topological information of the placement event by means of prepositions, some may use for example case marking (e.g. Levinson & Meira 2003). There can also be differences in the granularity of the placement verbs that are used to describe placement events (e.g. Kopecka & Narasimhan to appear; Viberg 1998). Some languages habitually use one general placement verb, whereas other languages can have more fine-grained placement verbs. French, for example, has the general placement verb *mettre* 'put' and Dutch has the

more fine-grained placement verbs *zetten* ‘set’ and *leggen* ‘lay’. There are also languages where the speaker can choose between a general placement verb and more fine-grained placement verbs. In these languages, the general placement verb tends to be the one that is habitually used.

In English, for example, speakers may use the verbs *set* and *lay*, but the default placement verb is *put* (cf. Gullberg to appear; Pauwels 2000). The semantic characteristics of the verbs already indicate that languages that use a general placement verb only encode the motion of the placement event, while a language with more fine-grained placement verbs takes properties of the object and the ground into account (Gullberg to appear). Speakers of Dutch, for example, need to think about the properties of the object and its orientation with respect to the ground in order to be able to choose between *zetten* ‘set’ and *leggen* ‘lay’. It can thus be argued that the semantics of the placement verb causes different mental representation patterns (Gullberg to appear). This would mean that mental representations of placement events are not universal but can be language-specific (Gullberg to appear).

3. Placement events and second language acquisition

Second language learners often find the domain of placement events difficult to master, especially when their L1 deals with placement events in a different way than their L2. Notorious are the problems learners have with prepositions, but it can also be difficult in the case of differentiation, when ‘there are several semantically contrasting translational equivalents in the target language, but the native speaker of the source language has no feeling that these equivalents correspond to different meanings in his/her language’ (Viberg 1998:344).

This difficulty can be caused by the fact that the speakers’ L1 has a different, more coarse-grained way to categorise placement events than the L2. The language learner needs to choose from several verbs which all translate into the same verb in the native language. Moreover, the different semantic characteristics of the verbs all have a language-specific event construal for the native speaker which makes it hard for the language learner to grasp the exact meaning differences between the placement verbs in the L2. The problem is therefore not just the form of the placement verb, but also the meaning (Gullberg submitted). We could say that the acquisition of placement verbs is more difficult when the two relevant languages have different ‘thinking for speaking’ patterns.

The hypothesis would then be that the speaker is ‘thinking for speaking’ in the first language when speaking a second language. This causes problems in choosing the correct placement verb in the L2 because the semantic characteristics of the placement verbs in the L2 are unknown or unfamiliar since they differ from the categorisation of the placement verb(s) in the L1.

In order to find out more about cross-linguistic differences in event representation, and more precisely, about the way in which speakers deal with these differences in ‘thinking for speaking’, the use of gestures will be taken into account.

4. Gestures

4.1. Types of gestures

Gestures are often defined as symbolic movements of the body (Kendon 2004; McNeill 1992). They can be performed with or without speech and are related to ongoing speech or the speaker’s communicative intention. Movements such as playing with a strand of hair or

scratching the face or other types of non-verbal communication such as blushing are excluded from this definition as these actions are not related to the speaker's communicative intention even though they may contribute to the overall communication. Excluding these types of non-verbal communication, many different gestures are still left. Multiple coding schemes exist which group these gestures (see Kendon 2004, for an overview).

For the purpose of this research only so-called representational gestures will be taken into account. These are gestures whose form has a strong relationship to the semantic content of what is being said (McNeill 1992). An example could be when someone says *she climbed up the tree*, while performing a gesture where a hand goes up, representing the person climbing up the tree. Another example would be when a speaker points while saying *that was at [his place]*. In this case the pointed finger also represents something other than itself, namely a location. These gestures all accompany speech.

4.2. Gestures and speech

The fact that speech and gesture are closely related is a longstanding observation in gesture research (Kendon 1986; McNeill 1992). This close relationship can be observed in several ways (for an overview, see Gullberg 2006; McNeill 1985). First, representational gestures tend to be performed when someone is speaking. Another reason is that gestures and speech usually represent the same meaning at the same time (McNeill 1992). Therefore, the semantic content of a gesture is usually in agreement with the semantic content of speech.

A gesture might give additional information, for example when someone is saying *she went up the tree*, while making a climbing gesture (in this case we only know the manner of going up by taking the gesture into account), but this additional information is generally closely related to the utterance. Another example where the gesture gives additional information would be when someone says *You have to go [there]* and we only know where *there* is by taking the accompanying deictic gesture into account. Also, gesture and speech are usually timed so that the meaningful part of the gesture, the stroke, is time-aligned with the speech that it is related to.

Even when a gesture is performed without speech, we can still see that it is closely related to speech. If we think about examples where a gesture is performed in between speech, the gesture is often a direct replacement of speech. An example could be when someone describes an action and says *and she [] the wastepaper basket*, where the square brackets indicate a gesture depicting the turning over of a wastepaper basket. In this example the gesture replaces the verb. Cases like this are also known as 'mixed syntax' (Slama-Cazacu 1976).

Although all these characteristics of gestures show that speech and gesture are related, the precise nature of the relationship between speech and gesture is a matter of debate (for an overview, see de Ruiter 2007). McNeill (1992) suggests that speech and gesture are outputs from one underlying process and form an integrated system. As such, gestures provide more information about language-specific event representation. Therefore, speech-accompanying gestures can be seen as a so-called window into thought. This also means that 'thinking for speaking' can be reflected in speech *and* gesture and that cross-linguistic differences in event representation can be visible in cross-linguistic 'thinking for speaking' (cf. Kita & Özyürek 2003; McNeill & Duncan 2000; Özyürek 2002). As Gullberg states, 'individuals differ with respect to how many gestures they are likely to perform, whereas speakers within a speech community and culture are remarkably consistent with regard to when and how they gesture when communicative content and situation are kept constant' (Gullberg 2006:107). Previous research on this topic has dealt with voluntary motion events (Kita & Özyürek 2003; McNeill & Duncan 2000). Another domain in which we can study language-specific 'thinking for

speaking’ as demonstrated in gesture use, is that of placement events (Gullberg to appear, Gullberg submitted).

5. Gestures and placement events

Since gestures can tell us more about event construal and placement events are described using placement verbs with language-specific semantic characteristics, the domain of placement events is an interesting domain to look at possible language-specific ‘thinking for speaking’. Differences in language-specific event representation, or event construal, should be visible in the gestures that speakers perform (Gullberg to appear). In other words, if a language only allows the speaker certain linguistic choices (Von Stutterheim & Nüse 2003), it may force the speaker to focus on certain aspects of an event. If this focus is not only reflected in the surface level of speech but is also there at the level of event construal, then this should also be evident in gesture. Placement events are a domain in which this hypothesis has been tested (Gullberg to appear, Gullberg submitted). As described above, different languages can have different types of placement verbs. A language with a habitually used general placement verb such as the French *mettre* ‘put’ can be argued to focus on the movement of the object during a placement event and not on the object itself due to the semantic characteristics of the verb. This is because the verb *mettre* ‘put’ is a so-called light verb with little meaning apart from ‘move/make move’. Therefore, in French, focus is, at least in speech, on the path of the placement event. Likewise, languages that use fine-grained placement verbs focus more on the object that is being placed because the semantic characteristics of the verb force the speaker to be attentive towards the object. This is due to the fact that, for example in Dutch, properties of the object such as its orientation towards the ground need to be taken into account in order to choose between the placement verbs *zetten* ‘set’ and *leggen* ‘lay’ (Gullberg to appear). These assumptions are based on speech only.

If we assume, as discussed above, that gesture and speech convey the same meaning at the same time and are thus closely related (McNeill 1992), then looking at gestures could help us find out whether the above mentioned differences in placement verb semantics truly reflect a deeper representational difference. That is, we should be able to *see* emphasis on either path or object in the speaker’s gestures, apart from hearing it in speech. By looking at gestures that are performed during the description of placement events, we can discover whether speech represents language-specific event representation (Gullberg to appear).

6. Previous research and resulting questions

In previous research on this topic (Gullberg to appear), speakers of Dutch and speakers of French took part in a director-matcher task in which the director had to watch eight video clips, each containing four placement events, and, after watching each clip, describe from memory to the matcher what happened in the clip. Each placement event consisted of one item that was moved. After the director described the actions, the matcher then had to draw each item onto a piece of paper. Speech and gesture data from the director was analysed. Speakers of French used the placement verb *mettre* ‘put’ most often and performed gestures which focused on the path of the placement event, i.e. their gestures showed movement, but no clear hand shapes. Speakers of Dutch, on the other hand, used the fine-grained placement verbs *zetten* ‘set’, *leggen* ‘lay’ and *hangen* ‘hang’ most often and their gestures showed emphasis on the object being placed. This was clear because the gestures showed object-incorporating hand shapes, that is, the shape of the hand gave information about the object

that was being moved. The languages that were studied here are fairly straightforward as far as placement verbs are concerned. French speakers use a general placement verb, while Dutch speakers use one of the fine-grained placement verbs. Results show that speech and gesture represent the same event construal and that language-specific event representation in the description of placement events exists (Gullberg to appear).

The results from this research also lead to some other interesting questions. For instance, what about the event construal in the description of placement events by speakers of languages which have a degree of optionality with regard to the placement verb that is used? In languages like English, a general placement verb is used most often (the verb *put*), but speakers also have a set of fine-grained placement verbs at their disposal (*set* and *lay*). Would a language like this also have language-specific ‘thinking for speaking’ or would the event construal be dependent on which placement verb the speaker actually intends on using?

Another question is what happens when a speaker describes a placement event in an L2 which has a different way of describing placement events than the speaker’s native language (Gullberg submitted). In the case of differentiation, the speaker might find it difficult to deal with the different placement verbs in the L2. If this cross-linguistic difference in categorisation reflects cross-linguistic differences in ‘thinking for speaking’, or in other words, if the different placement verb categories reflect deeper underlying differences in event construal, then this might at least confuse the L2 speaker. We can also look at speakers’ gesture use in order to find out more about L2 event representation. This is because ‘[...] the learner’s gestures allow us to glean information about L1-L2 interactions at the level of semantic-conceptual representations’ (Gullberg 2008:277). Even when L2 speech is native-like, results from speech-accompanying gesture analysis have shown that speakers may still not be relying on target-like event representations in their L2 (Gullberg submitted). This means that gesture data can give additional information about L2 event representation which is not present in speech.

This, however, does not exclude the possibility that L2 speech can reflect deeper underlying changes in event construal. Gesture can, in these cases, provide additional evidence. Previous research (e.g. Özyürek 2002) has shown that learner’s gestures can change depending on whether they speak in L1 or L2. This would mean that it is possible for speakers to change their event representation (for an overview of previous research, see Gullberg 2006, 2008, submitted).

As part of an ongoing project, research on the above questions has been done with native speakers of Dutch and French and with Dutch learners of French (Gullberg to appear, Gullberg submitted). Not much is known about language-specific and L2 event representation in placement events as visible in the use of gestures by speakers of other languages, however. The remaining part of this paper will deal with these questions by discussing gesture use in the description of placement events by speakers of English. The experimental setup has been kindly provided by Gullberg and, apart from the description given below, can also be found in Gullberg (2002) and in Gullberg (to appear, submitted).

7. The use of gestures in placement events: an experimental setup

7.1. Introduction

In order to find out more about language-specific ‘thinking for speaking’ and about the way in which speakers deal with this when they speak a second language, a follow-up study is being conducted. This study is in progress with results pending. However, some preliminary findings will be given below.

Native speakers of English took part in the same director-matcher task as in Gullberg (to appear). Speakers of English were chosen because English is a language with a certain degree of optionality with regard to the choice of placement verbs a speaker has when describing a placement event. Results from this group of speakers should tell us more about whether the habitually used placement verb is what causes language-specific event construal or whether the placement verb used by the speaker at the time (which may not be the habitually used verb *put* but for example a fine-grained placement verb like *set*) is relevant for event representation.

The same experimental setup can be used in order to answer the question how second language speakers deal with language-specific event representations. For it to be possible to interpret results from L2 speakers however, a baseline of L1 data is needed. An interesting L1-L2 combination would be English-Dutch. This is because firstly, once the results from the study in progress are known, there will be baseline data for both L1 English and L1 Dutch (Gullberg to appear). Moreover, as has become clear by now, English and Dutch differ in the granularity of their placement verbs so that speakers may also have different event representations when they describe placement events. Results from Gullberg (submitted) show that speakers moving from a fine-grained to a coarse-grained verb system may still be relying on L1 event representation, but also that they do shift towards L2 ‘thinking for speaking’. By looking at Dutch speakers of English we can compare these findings and see whether the results from Gullberg (submitted) are language-specific or whether they can tell us something about moving from a fine-grained system to a coarse-grained system in general. By looking at English speakers of Dutch we can see what happens to ‘thinking for speaking’ when the learner needs to deal with a fine-grained verb system that the L1 does not have.

7.2. Hypotheses

Since placement events in English are usually expressed by the general placement verb *put* in speech, the hypothesis is that these speakers, when they gesture about the placement event, show gestures that are concerned with the path of the event, regardless of which verb is actually used in that particular description. If this is the case, we can show that speech and gesture reflect the same underlying event representation and that in English ‘thinking for speaking’ emphasis about placement events is on the path of the event. Alternatively, speakers might change their gestures depending on which placement verb they use. If, for example, one speaker of English uses the fine-grained placement verb *lay* while making a gesture with an object-related hand shape, while another speaker uses the general placement verb *put* while making a gesture that only shows path, then these results could be used to argue that ‘thinking for speaking’ depends on the verb that is used at that particular time and that the habitually used (as defined by Slobin 1991) placement verb is not what causes language-specific ‘thinking for speaking’.

The hypothesis for second language learners is that, depending on their level of proficiency and assuming there is a language-specific ‘thinking for speaking’, they will either ‘stick’ to their L1 event representation or will take on the L2 ‘thinking for speaking’. It can be expected that less proficient L2 speakers will have the most difficulty in dealing with different ‘thinking for speaking’. This should be visible both in speech and in gesture which will both show transfer (Odlin 1989) from L1 event representation. Once a speaker becomes more proficient, we might be able to see a change to L2 ‘thinking for speaking’ if the L2 speaker uses both L2 native-like speech and similar gestures to native speakers of the L2. It could also be the case however, that L2 speakers might sound native-like in speech, but will still have an L1 event construal which will be visible in their use of gestures (Gullberg submitted). Even

though their speech might sound proficient, speakers might have a ‘manual accent’ (Kellerman & Van Hoof 2003) where the gestures that are used are typical of the L1, revealing a continued use of L1 event representation (Gullberg submitted; Kellerman & Van Hoof 2003). Alternatively, speakers may be in between language systems (Gullberg submitted).¹

7.3. Method

In order to test the above hypotheses, native speakers of English took part in a director-matcher task that was set up as follows (Gullberg 2002). Two participants are seated opposite each other at a table. The director has a laptop on which eight videoclips are shown. The videoclips show a girl cleaning up a messy room. In each clip, four items are placed somewhere. After watching each clip, the director has to describe from memory to the matcher what happened in the clip. The matcher then has to draw the items on a piece of paper which has the outlines of the room on it. During the description of the placement events the laptop screen is blank in order to avoid any pointing at the screen and to make sure that the director describes the actual placement event and not just the final location of the objects. Once the matcher has finished drawing the four items, the director can watch the next clip until all eight clips have been described. There is no mention of gestures in any of the instructions given to the director and the matcher. Everything is recorded by a videocamera that is set up in such a way that the director is clearly visible. Speech and gesture data from the director are digitised and are then annotated using the ELAN software (Brugman & Russel 2004). This experiment can take place in different languages, since the videoclips do not have sound. The matcher always has to be a native speaker of the language in which the experiment is conducted. If a speaker is to take part twice, in L1 and in L2, the order in which this is done needs to be counterbalanced over subjects so that any possible effects from doing the experiment twice can be disregarded. A possible setup can be seen in figure 1.

Figure 1. Possible setup with director on the left and matcher on the right



Remembering that speech and gesture usually convey the same meaning at the same time and that gestures can help in finding out more about language-specific event representation of placement events, we need to identify at least the following aspects when annotating the data.

¹ Theoretically, it could also be the case that a speaker might look native-like in L2 gesture while still using L1 speech. This view rests on the assumption that gesture might change without speech. The literature suggests, however, that gesture change is linked to speech change, regardless of whether the speaker has seen a native model or not (e.g. Brown 2007; Brown & Gullberg 2008; Özyürek, Kita, Allen, Furman & Brown 2005).

All gesture analysis has to be speech-based, so firstly a selection of the description of the actual placement events needs to be made. Once we know the speech of the placement event, then the relevant placement verb can be identified and any possible gestures occurring during the description of the placement event can be selected. We can then look at whether these gestures show an object-incorporating hand shape or not. An object-incorporating hand shape can be defined as a hand shape which reflects (some properties of) the figure object. If an object-incorporating hand shape is absent, the gesture can be coded for path only. It must be noted that the sound must be turned off during coding, so that coding takes place for form only.

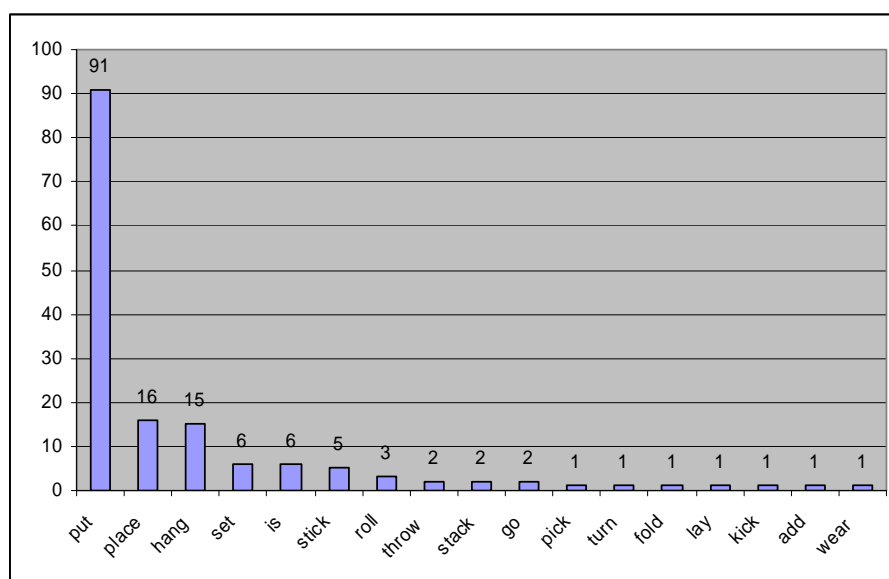
Once annotations have been made, it will be possible to look at the following aspects. First, it will become clear which placement verbs have been used. Second, we can see what type of gestures have been used. Third, by looking at speech-gesture alignment, we can find out what constituent the gesture stroke is aligned with. This will make it clear whether the gesture is performed during the placement verb itself or during, for example, the prepositional phrase following it (e.g. *She puts the bear [on the table]*). We can then also look at whether object-incorporating hand shapes occur when fine-grained placement verbs are used or not. By linking all the findings in several ways, many more questions can be answered.

7.4. Preliminary findings

Data from ten speakers of English who did the experiment in English only and two speakers of English who did the experiment both in Dutch and in English have been collected. Results are not final yet and have not yet been statistically analysed. However, keeping this in mind, some preliminary findings from five of the speakers of English who did the experiment in English only can be reported on.

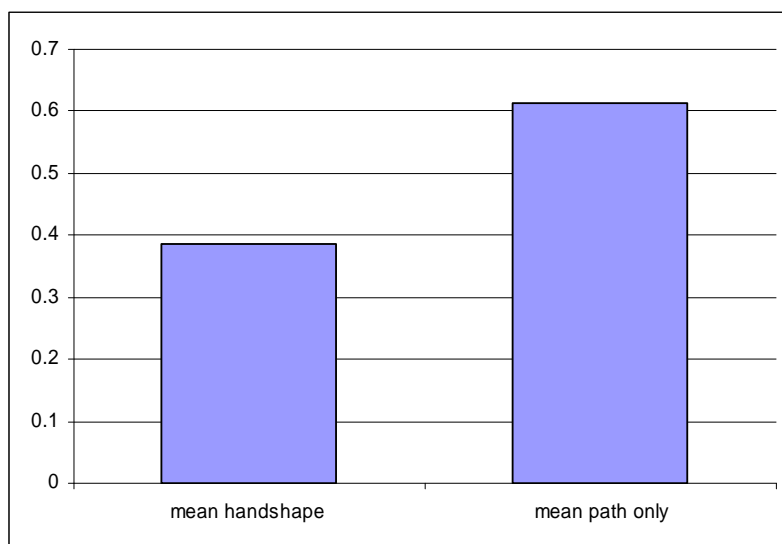
Firstly, when we look at the types of verbs used during the description of the placement events we can see that the verb *put* is the main verb that these five speakers of English use. A large number of more fine-grained placement verbs such as *stack* and *lay* are used only once or twice.

Figure 2. Types and tokens of verbs used by five speakers of English (tokens in raw numbers)



Secondly, when we look at the types of gestures performed during the description of the placement events, we can see that, for these five speakers of English, there is a higher mean percentage of gestures showing path only than gestures showing an object related hand shape. However, gestures with an object related hand shape do occur fairly often. Again, due to the preliminary nature of these findings results are not statistically analysed yet and may or may not be significant.

Figure 3. Mean percentage of types of gesture over five speakers of English



Results on the constituent alignment of the placement gestures made by these five speakers are not known yet. It is also not known yet whether the gestures showing path only were performed when using the general placement verb *put* and whether the gestures with object-related hand shapes were performed when more fine-grained placement verbs were used or whether there is no link between the type of verb used and the type of gesture performed.

8. Conclusion

Since the data from this particular experiment are still being annotated, and we only have preliminary findings from five speakers, conclusive results are still pending. Data from the other speakers of English would need to be taken into account and statistical analyses would have to be run in order to see whether the preliminary findings given above still hold. A pilot study was conducted where two speakers of English took part both in Dutch and in English, but these data also still need to be analysed. Once the data from the subjects who did the experiment in English only are known, it will be possible to use these as a baseline for the L2 data. Therefore, no overall conclusion about English event representation in the description of placement events can be given yet. Based on the preliminary findings we could speculate that it might be the case that, as hypothesised, speakers of English use the general placement verb most often while performing path only gestures. However, this is pure speculation and before drawing any conclusions we must await further results.

Previous research has already shown that speakers' gesture use can provide us with an insight into language-specific 'thinking for speaking' and that gestures can provide more information about event representation than speech alone gives us (e.g. Gullberg to appear,

Gullberg submitted; Özyürek 2002). However, not a lot of research on (L2) event representation in placement events exists in which gestures are also taken into account. The only languages investigated so far have concerned native speakers of Dutch, French and Dutch speakers of French (Gullberg to appear, Gullberg submitted).

In order to find out if it is possible to generalise the results from these studies and in order to find out about other language-specific ‘thinking for speaking’ in placement events, it is necessary to analyse data from more languages. A start has been made by having native speakers of English take part in a director-matcher story-telling task. Results from this study will contribute to existing cross-linguistic research on event categorisation (Majid et al. 2004), research on language-specific placement events (Kopecka & Narasimhan to appear), and will provide additional evidence that gestures can be used as a tool with which we can find out more about language-specific event construal.

Acknowledgements

This paper describes part of an internship at the Max Planck Institute for Psycholinguistics. I would like to thank Marianne Gullberg for supervision, comments and helpful discussions, Ad Backus for comments on a previous version of this paper, Bastiaan Roset and Nick Wood for technical assistance and Leah Roberts for checking my use of English. Part of this paper was presented at the T.W.I.S.T. Conference on April 13, 2007 in Leiden. I would like to thank the audience for useful questions.

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